DUGWAY PERMIT

MODULE VII

ATTACHMENT 3

HWMU 2
POST-CLOSURE PLAN

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

A	Amber
AB	Ambient Blank
ABP	Agent Breakdown Product
AGEISS	AGEISS Environmental
bgs	below ground surface
cm/sec	centimeters per second
CS	o-chlorobenzalmalononitrile
DOD	Department of Defense
DOT	U.S. Department of Transportation
DQO	Data Quality Objective
DRMO	Defense Reutilization Management Office
DSHW	Division of Solid and Hazardous Waste
Dugway	Dugway Proving Ground
EB	Equipment Rinse Blank
FD	Field Duplicate
ft	feet
ft/day	feet per day
FWEC	Foster Wheeler Environmental Corporation
FWV	Field Work Variance
FY	Fiscal Year
GPI	Granite Peak Installation
GWM WP&SAP	Groundwater Monitoring Work Plan & Sampling and Analysis Plan
HSWA	Hazardous and Solid Waste Act
lb	pounds
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
µL	microliter
mg/L	milligrams per liter
mL	milliliter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
msl	Mean Sea Level
NA	Not Applicable
NS	Normal Sample
OP	Operating Procedure
PCB	Polychlorinated Biphenyl
pCi/L	pico Curies per liter
PCP	Post-Closure Plan
PE	Polyethylene
PP	Portable Pump
PQL	Practical Quantitation Limit
PST	Planned Sample Table
QC	Quality Control
SB	Submersible Pump (Dedicated)
SB	Source Blank
SBV	Site Background Value

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS, cont.

SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TDS	Total Dissolved Solids
TOC	Total Organic Compound
TOX	Total Organic Halide
TSDF	Treatment, Storage, and Disposal Facility
TSS	Total Suspended Solid
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
UDSHW	Utah Division of Solid and Hazardous Waste
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
WG	Groundwater
WH	Source Water
WQ	QC Water
WP&SAP	Work Plan and Sampling and Analysis Plan

1.0. INTRODUCTION

The objectives of the Hazardous Waste Management Unit (HWMU) 2 Post-Closure Plan (PCP) are: 1) ensure that Dugway Proving Ground (Dugway or DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §265.117, with respect to post-closure inspections, care, and groundwater monitoring, and 2) prevent exposure to the buried landfill waste. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, inspections, and post-closure care and maintenance at HWMU 2. Post-closure care will ensure that the engineered soil cover at HWMU 2 is maintained and functions as designed. Post-closure care will continue for a minimum of 30 years after closure of HWMU 2. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

Technical personnel conducting post-closure activities will be qualified personnel capable of performing the duties identified in this PCP and shall be in compliance with Permit Condition VII.L.

In accordance with 40 CFR §270.28 and Utah Administrative Code (UAC) R315-3-2.19, the post-closure permit is required to include specific information for a closed facility. As applicable to HWMU 2, the information requirements include:

1. General description of the facility;
2. Description of security procedures;
3. Copy of general inspection schedule;
4. Preparedness and Prevention Plan;
5. Facility location information
6. Closure Plan or Closure Proposal;
7. Certificate of Closure; and
8. Topographic map, with specific scale.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in the Attachments or in the PCP where the specific information is presented.

Table 1-1: Summary of HWMU 2 Post-Closure Information Requirements Under 40 CFR §270.14 and UAC R315-3-2.19 and R315-3.2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) UAC R315-3.2.5(b)(1)	General Description of the Facility	Post Closure Permit, Attachment 1
40 CFR §270.14(b)(4) UAC R315-3.2.5(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) UAC R315-3.2.5(b)(5)	General Inspection Schedule	Section 8.1, Module VII Table VII-3, and Module VII Form C parts 1-3
40 CFR §270.14(b)(6) UAC R315-3.2.5(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) UAC R315-3.2.5(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Attachment 1; Section 4.0.
40 CFR §§270.14(b)(11) (iii-v) UAC R315-3.2.5(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 5.0
0 CFR §270.14(b)(14) UAC R315-3.2.5(b)(14)	Closure Certification and Notification	Appendix A
40 CFR §270.14(b)(16) UAC R315-3.2.5(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) UAC R315-3.2.5(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2-4; 1 inch = 20 feet 2.5; 1 inch=1000’
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (ii)	Topographic Map 100-year floodplain area	HWMU 2 is not located within a verified 100-year floodplain area (Figure 2-5).
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	There are no surface waters or intermittent streams within the HWMU 2 area (Figure 2-4).
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (iv)	Topographic Map Surrounding land uses	HWMU 2 is within a military base. There are no nearby operations in the vicinity of HWMU 2. See Figure 2-4 & 2-5
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing wind speed and direction)	The unit is closed with an engineered soil cover. There are no residential populations in the vicinity of HWMU 2. The closest residential area is English Village (approximately 30 miles away). A wind rose is not deemed necessary for HWMU 2.
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2-4 & 2-5
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	The fenced area is shown in Figure 2-4.
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (viii)	Topographic Map Access control, fence, gates	The fenced area and access gates are shown in Figure 2-4.
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (ix)	Topographic Map Injection and withdrawal wells	There are no injection or withdrawal wells in the vicinity of HWMU 2. The monitoring wells are

Table 1-1: Summary of HWMU 2 Post-Closure Information Requirements Under 40 CFR §270.14 and UAC R315-3-2.19 and R315-3.2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
		shown in Figure 2-4.
40 CFR §270.14(b)(19) UAC R315-3.2.5(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	The HWMU site is graded to drain away from the soil cover. Also, a drainage ditch was constructed on the southwest side of the site. See Figure 2-4
40 CFR §270.14(c) UAC R315-3.2.5(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Section 2.4; HWMU 2 Closure Report Initial Groundwater Sampling 1995. Detection Program (four quarters) 1999-2000 (UAC R315-13). Assessment Program (4 semi-annual events) 2001-2002 (UAC R315-13) No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Section 2.6; HWMU 2 Closure Report No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2-5 (fenced area shown); HWMU 2 Closure Report includes the Legal Description for HWMU 2 No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(4)	Groundwater Monitoring Information Extent of Plume	Section 2.4 includes a description of the groundwater data. There is no identified plume at HWMU 2. No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Section 2.0 No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(6)(i)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2. Proposed List of Parameters	Section 2.0; HMWU 2 Closure Report No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(6)(ii)	Groundwater Monitoring Information	No additional post-closure groundwater monitoring is required at HWMU 2 (see Section

Table 1-1: Summary of HWMU 2 Post-Closure Information Requirements Under 40 CFR §270.14 and UAC R315-3-2.19 and R315-3.2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
	No Hazardous constituents are present in the groundwater at HWMU 2. Proposed Groundwater Monitoring System	2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(6)(iii)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2 Background Values	No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) UAC R315-3.2.5(c)(6)(iv)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2. A description of the Proposed Sampling	No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)

2.0. HWMU 2 DESCRIPTION

The following provides a general description of HWMU 2, also known as the Waste Pile at the North End of Granite Peak at Dugway (Figure 2-1). The facility information requirements specified in UAC 315-3-2.5(d) for Solid Waste Management Units (SWMUs) is addressed under the Dugway Proving Ground Storage Permit. A general description of the Dugway installation can be found in Module VII, Attachment 1.

2.1 Location and History

HWMU 2, known as the Waste Pile at the North End of Granite Peak, is a closed HWMU located north of Granite Peak and approximately 1,000 feet (ft) north of Stark Road (Figure 2-5). Figure 2-2 shows the location of HWMU 2 with respect to Granite Peak. This HWMU is located on a relatively flat valley floor at an approximate elevation of 4,290 ft mean sea level (msl). The nearest operating Dugway facility is the Baker Area, located approximately 12 miles east of Granite Peak. The central portion of Dugway, in which HWMU 2 is located, is now primarily used for test ranges. In the past, munitions disposal, decontamination, and other demilitarization activities were also conducted in this portion of Dugway.

HWMU 2 was used for disposal of a variety of solid wastes generated during range cleanup and the demilitarization activities. The unit consisted of two unlined trenches that were positioned end to end and trend northwest-southeast (See Figure 2-3). These trenches were approximately 50 ft apart. Ridges of excavated soil that were four to six ft high were located adjacent to each trench on the east side. The northern trench was about 145 ft long, eight ft wide, and three ft deep, and the southern trench was approximately 110 ft long, 16 ft wide, and two to four ft deep. The central portion of the southern trench

was backfilled with material from an adjacent pile of native soil to create a roadway across the trench for environmental sampling. A small drainage feature entered the southern end of the southern trench and another drainage feature exits the northern trench at the northern end. The northern half of the northern trench was vegetated with shrubs. Other features observed at HWMU 2 included a small area of burned material adjacent to the northern trench, which has since been excavated during closure activities.

2.2 Past Operation

HWMU 2 was used for disposal of a variety of solid wastes generated during range cleanup and the demilitarization activities. The unit may have also received biological agent laboratory wastes from Granite Peak Installation No. 2 (GPI-2), a former testing laboratory located 0.5 miles southeast of HWMU 2. According to a former Dugway employee, HWMU 2 had been in use since 1960. However, historical aerial photographs indicate the trenches were present in 1953. Disposal activities at HWMU 2 ceased prior to 1993 when a removal action was conducted at this unit.

During an October 1991 site visit, each trench was observed to be filled with debris from a maximum depth of five ft to within two to three ft of the ground surface. Backfill and eroded soil partially covered the debris. The wastes observed in the trenches at that time included miscellaneous trash, scrap metal, construction debris, asbestos cylinders, laboratory waste, empty decontamination solution containers, landing mats, ordnance-related debris, and potential 3X materials. Among these items was a 500- to 700-pound (lb) German bomb that previously contained Tabun (GA). The bomb had been bored and the agent drained from the bomb before it was placed in the northern trench. An expanded burster tube for chemical weapons was identified in the small excavation east of the southern trench. Spent o-chlorobenzalmalononitrile (CS) canisters, glass fragments, and light bulbs were identified on the surface near the two trenches.

In 1993, surface debris was removed from the trenches during a removal action. Approximately 4.9 tons of salvageable scrap was taken to the Defense Reutilization Management Office (DRMO) and the remaining 31 tons of surface debris were taken to the Dugway Landfill on Stark Road for disposal.

HWMU 2 was one of the 27 sites listed at Dugway under the Utah Department of Environmental Quality – Division of Solid and Hazardous Waste (UDEQ-DSHW) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed Dugway to determine whether hazardous waste management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 2 among the sites to be closed.

2.3. Previous Investigations Documentation

Previous investigations at HWMU 2 have included geophysical, test pit, and soil investigations. Further details are included in the HWMU 2 Closure Report and in the Foster Wheeler Closure Plan (FWEC, 1998).

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 2 are provided in the Utah DSHW (UDSHW) public documents listed in Table 2-1.

Table 2-1: Pertinent UDSHW Library Documents Detailing HWMU 2 Investigations

Document Title	Received Date	UDSHW Library No.
IT, 2001a. *Final 100% Design Report for HWMU 2 Waste Pile at the North End of Granite Peak, Dugway Proving Ground, Dugway, U*	6/1/2001	DPG 00222
IT, 2002. *Final Groundwater Monitoring Work Plan and Sampling and Analysis Plan for the Consent Order Groundwater Monitoring Program, Dugway Proving Ground, Dugway, Utah, Revision 2.*	4/19/02	DPG 00274
IT, 2003 *Final Closure Report Hazardous Waste Management Unit (HWMU) 2; Waste Pile at North end of Granite Peak.*	2/28/2003	DPG 00318
PES, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III: Downrange Groundwater Management Area*. June.		

2.4 Closure Activities

The closure of HWMU 2 has been completed. Approval for the HWMU 2 Closure Report (IT, 2003) was received in a letter dated from March 20, 2003, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 2 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. In compliance with UAC R315-7-21, the HWMU 2 closure provided a cover that will: 1) protect human health and the quality of the environment under conditions of continuing military use; 2) control, minimize, or eliminate the escape of hazardous constituents to soil, surface, groundwater, or the atmosphere during its closure and post-closure period; and 3) minimize the need for further maintenance. The final cover system (a two-ft thick engineered, evapotranspiration soil cover) was designed and constructed to satisfy the requirements of these regulations namely:

1. Provide long-term minimization of migration of liquids through the closed landfill;
2. Function with minimum maintenance;
3. Promote drainage and minimize erosion or abrasion of the cover;
4. Accommodate settling and subsidence so that the cover's integrity is maintained; and
5. Have a permeability less than or equal to the permeability of any bottom liner or natural subsoils present.
6. Major closure activities at HWMU 2 included:
7. Excavation and disposal of burn area soil to remove elevated arsenic and dioxins/furans concentrations and discolored burnt soil followed by confirmation sampling and backfilling;

8. Installation of an engineered evapotranspiration soil cover;

9. Installation of a chain-link fence around the engineered soil cover; and

10. Upgrade of the existing access road, grading, and erosion control activities to minimize long-term maintenance requirements.

11. The final closure cover system consisted of the following components (from bottom to top):

12. A minimum one-foot thick layer of self-compacting fill;

13. A compacted subgrade layer comprised of clean soil imported from the Dugway landfill;

14. An 18-inch thick layer of controlled permeability (permeability range of 1 x 10^{-4} centimeters per second (cm/sec) to 1 x 10^{-6} cm/sec); and

15. A 6-inch thick layer of vegetated soil cover.

All construction activities were completed in accordance with applicable UAC regulations, the Remedial Action Plan, the 100% Design Report, and approved Field Work Variances (FWVs). Figure 2-4 shows the post-closure configuration of the HWMU 2 engineered soil cover and existing site conditions.

All the permeability tests conducted on the 18-inch thick controlled permeability layer passed the established criterion of 1 x 10^{-4} cm/sec to 1 x 10^{-6} cm/sec. After completion of the 18-inch thick low permeability layer, the 6-inch thick vegetated soil layer was installed in a single lift using the same source of import material from the Dugway Landfill. This final lift (vegetated layer) was then drill-seeded. The selected vegetation is in compliance with the Forage and Conservation Planting Guide for Utah (EC433) developed by the Cooperative Extension Service of Utah State University (Utah State University, 1989) and appropriate for arid environments.

Other construction activities included construction of a swale and other miscellaneous grading around the landfill, installation of a chain-link fence and appropriate signage around the engineered soil cover, upgrading the existing road for access during the rainy season, and re-seeding the disturbed areas outside the engineered soil cover. As part of general grading efforts, drainage along the east side of the former dirt road was redirected to the west side of the road by construction of a swale. The swale has a maximum depth of six inches. General grading was also completed to fill low-lying areas around the southern and eastern sides of the soil cover to prevent precipitation from running onto the soil cover. The road improvements consisted of upgrading the existing dirt road. The cross section of the roadway as designed and constructed is approximately 12 ft wide and eight inches thick with a twopercent crown along the centerline of the roadway. Final lines and grades were surveyed for as-built documentation purposes.

2.4.1 Post Closure Regulatory Basis

Utah has specific regulations governing the closure and post-closure requirements for interim status hazardous waste treatment, storage and disposal facilities (TSDFs) (UAC R315-7-14). Post-Closure groundwater monitoring requirements must comply with requirements specified in UAC R315-7-21 and R315-7-13. These regulations are derived from 40 CFR §265 subparts F (Groundwater Monitoring) and

subpart G (Closure and Post-closure Care). In accordance with UAC R315-7-21.4b, the following are the requirements for post-closure care:

1. After final closure, the owner or operator shall comply with all post-closure requirements contained in UAC R315-7-14, which incorporates by reference 40 CFR §§265.110 - 265.120, including maintenance and monitoring throughout the post-closure care period. The owner or operator shall:

2. Maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, or other events;

3. Maintain and monitor the leak detection system in accordance with UAC R315-8-14.2(c)(3)(iv) and (4) and R315-7-21.12(b), and comply with all other applicable leak detection system requirements of UAC R315-7. The HWMU 2 engineered soil cover is exempt from this requirement because it qualifies as an "existing unit" exempt from the minimum requirements imposed by Hazardous and Solid Waste Agency (HSWA) for new landfills.

4. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of UAC R315-7-13. HWMU 2 is exempt from this requirement as additional groundwater monitoring at HWMU 2 is not required (PES, 2007);

5. Prevent run-on and run-off from eroding or otherwise damaging the final cover; and

6. Protect and maintain surveyed benchmarks used in complying with UAC R315-7-21.3."

Based on the work performed at HWMU 2 and the risk evaluations presented in the Final Closure Report, the requirements specified under 40 CFR §265, subpart G and a Consent Order have been achieved.

The detailed results of previous material, soil, and groundwater sampling at HWMU 2 are included in the. *Draft Final Closure Report for HWMU 2 Waste Pile at the North End of Granite Peak (Closure Report), Dugway Proving Ground, Dugway, Utah (IT, 2003b).*

The closure of HWMU 2 has been completed. Approval for the HWMU 2 Final Remedial Action Closure Report (IT, 2003) was received in a letter dated March 20, 2003, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 2 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. UDSHW verified the Closure of HWMU 2 on August 4, 2003. With the investigative, remedial, and closure actions performed at this site, all stipulations of the Consent Order has been satisfied for HWMU 2.

2.5 Groundwater

Four shallow groundwater monitoring wells (MW01, MW02, MW03, and MW04) were installed at HWMU 2. Sampling of these wells since 1995 has resulted in no data indicating a release to groundwater at HWMU 2. Groundwater is also classified as non-potable.

According to the downrange GMA no additional post closure groundwater monitoring is required at HWMU 2; however, in order to confirm previous groundwater sample results, an additional round of groundwater monitoring will be conducted in conjunction with the five (5) year review. All subsequent groundwater monitoring for HWMU 2 will be conducted in accordance with the downrange GMA.

2.6 Closure Notifications

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 40 CFR §§264.116 and 264.119, which are incorporated by reference in UAC R315-8-7.

3.0 SECURITY AND CONTINGENCY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 2:

1. HWMU 2 is located within a federal, military installation (Dugway). As such, the installation is restricted for the common population. Access to HWMU 2 is strictly monitored by Dugway Base Security (Range Control).

2. Specifically at HWMU 2, a fence with two locked gates surrounding the closed unit on all sides, which prevents unauthorized entry, shall be maintained throughout the post-closure care period.

3. Signs, which read "DANGER, UNAUTHORIZED PERSONNEL KEEP OUT", are posted at the entrance gates and every 50 ft along the fence and shall be maintained throughout the post-closure care period. The signs must be legible from a distance of at least 25 ft in compliance with UAC R3l5-8-2.5(c).

4. All security equipment shall be inspected throughout the post-closure care period. The Permittee shall incorporate those security items (i.e., fence, signs of vandalism, etc.) to be inspected and the frequency of inspection on the inspection schedule.

5. Damaged security equipment shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with UAC R3l5-8-2.6(c).

3.1. Contingency Plan

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the Dugway area that may affect the soil cover at HWMU 2. Module VII, Form C part 3, is a site-specific post-closure site inspection/emergency response inspection checklist.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

3.1.1. Earthquakes

Dugway is located in Seismic Zone 2 with a maximum acceleration of 0.16 gravity force (IT, 2001a). In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

3.1.2. Floods or Major Storms

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 hours of the event. A site-specific post-closure site inspection checklist is included as Form C in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

3.1.3. Fire

The event of a fire is an unlikely event at HWMU 2 given its remote location with respect to other base facilities. Nonetheless, in the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the site-specific post-closure emergency response checklist included in Form C part 3 in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.0. SEISMIC STANDARD

HWMU 2 is not located within 200 ft of faults, which have displacement in Holocene time. Although, Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills. The U.S. Geological Survey has conducted a study ([U.S. Geological Survey (USGS), 1988]. Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1°x2° Quadrangle, Northwestern Utah. Compiled by T.P. Bamhard and R. L. Dodge) to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1x2 Quadrangle in northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era with no clear evidence of Holocene surface faulting. Several faults inferred on geophysical evidence are located on Dugway; however, there is no evidence of displacement during Holocene time.

5.0. FLOODPLAIN STANDARD

HWMU 2 is not located within a 100-year verified floodplain. A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for Dugway. These are no

permanent streams or other surface water bodies on Dugway. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center.
HWMU 2 is located at the north end of Granite Peak, approximately 20 miles from the Ditto Technical Center. Because of the location of HWMU 2, it is not likely that a 100-year flood would affect the site.

The area around HWMU 2 has been graded to divert surface water away from the engineered soils covers. In addition, a swale was constructed along the southern edge of the site to diver runoff coming from Stark road (Figure 2-4).

6.0 POST-CLOSURE OPERATIONS, MAINTENANCE AND REPORTING

The HWMU 2 waste pile has been covered with an engineered soil cover. The following sections discuss the Operation and Maintenance (O&M) procedures and the Reports required to ensure maintenance and monitoring of the engineered soil cover during the post-closure period.

6.1 Site Inspections

General site inspections of the landfill area will be conducted semi-annually by May 1st and November 1st to ensure that the integrity of the landfill cap is maintained. The following post-closure inspections will be required:

1. General site inspections;
2. Vegetative cover inspections;
3. Soil Erosion Control inspections.

The site-specific post-closure site inspection checklist for HWMU 2 provided as Form C, parts 1 through 3, will be used for documenting the above required inspections.

6.1.1. General Inspection

The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. Proper warning signs are present;
2. The perimeter fence is in good condition and secured;
3. No weeds (with deep taproots) are present that may penetrate the cap;
4. No excessive soil erosion is evident on the cap surface or at the cap edges;
5. No noticeable damage to the soil covering from burrowing animals;
6. No excessive vegetation is growing in the swale drainage ditch;
7. No noticeable depressions or ponded water are present;
8. No noticeable sliding (slope failure) or desiccation cracks are present in the soil cover; and
9. No excessive erosion of the all-weather road accessing and surrounding the HWMU 2 soil cover is evident.

As part of the routine inspection, settlement marker locations and elevations should be surveyed at least once every six months for the first year after construction, and annually thereafter. When a settlement of 0.1 foot or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northings, eastings (State Plan, Nad 83 Central Zone), and elevations of the settlement markers are summarized in the table below.

Table 6-1: Surveyed Coordinates for HWMU 2 Settlement Markers.

Type	Location	Northing (ft)	Easting (ft)	Elevation (ft above msl)
Settlement Marker (SM-1)	South end of soil cover	7237846.49	1136002.64	4283.56
Settlement Marker (SM-2)	North end of soil cover	7238035.42	1135922.90	4284.73

6.1.2. Vegetative Cover Inspection

The vegetative cover will be inspected at the time of the regularly scheduled general inspection to ensure proper vegetation growth that prevents soil erosion. As with the general inspections, upon approval from the Executive Secretary, the vegetative cover inspections can be reduced to once per year, once vegetation has established a healthy growth cycle. A vegetative cover inspection checklist, which is part of Form C in Module VII, should be completed.

The types of grasses seeded on the engineered soil cover included crested wheatgrass, Sandberg Bluegrass, and Bottlebrush Squirrel Tail. These are bunchgrass species that are native to Dugway and drought-resistant which is ideal for arid environments. These are also effective for soil erosion and evapotranspiration. Bunchgrasses grow in bunches or tufts and are not "full cover." Therefore, it is expected that bare patches on the vegetative cover will be visible.

The vegetative cover should be inspected for:

1. Areas of stressed or missing vegetation on the cover (bald spots);
2. Areas of continual poor growth despite reseeding efforts;
3. Invasive (cheat grass) or deep-rooting species; and
4. Impacts from burrowing animals.

Inspections will be made to ensure that the vegetative layer is functioning as designed (i.e., erosion protection). If erosion is evident, affected areas will be repaired, and the area be reseeded using the original seed mix used during closure activities (IT, 2003b) at the direction of the Dugway Environmental Office.

6.1.3. Soil Erosion Control Inspection

The surface water control system should be inspected to ensure that it is providing adequate erosion control. The HWMU-2 specific post-closure site inspection checklist (Form C) in Module VII includes procedures for ensuring that soil erosion is controlled.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) and continual (recurring in the same area), corrective action may be needed. Significant cracks and/or rills that have the potential to impact the functionality of the cover system will be documented in the inspection forms. Corrective actions may include filling in the eroded or cracked area, investigating the cause of erosion, and regrading slopes.

6.1.4. Corrective Action

For most routine repairs, corrective action should be initiated as soon as practical after identifying the problem, or as directed by Dugway. If the corrective is extensive, or will require more that 30-days to complete, then Dugway shall provide a corrective action schedule for approval by the Executive Secretary. Table 6-2 presents the Post-Closure Inspection Schedule for HWMU 2, and lists the items to be inspected and potential problems. Most inspections will be performed semi-annually. Inspection personnel will note any problems found and will inform appropriate Dugway representatives.

Table 6-2: HWMU 2 Post-Closure Inspection and Monitoring Schedule.

Inspection/Monitoring Item	Method of Documentation (From C parts 1-3, Module VII)	Frequency of Inspection
Soil Cover Inspection: cover integrity erosion settlement subsidence surface water drainage systems	HWMU-2 Specific General Post-Closure Site Inspection Checklist (Module VII, Form C part 1)	Semi-Annual Spring Inspection due by May 1st; And the fall inspection due by November 1st. An additional inspection shall be required after a heavy rain event.
Vegetative Cover	HWMU-2 Specific Vegetative Cover Post-Closure Site Inspection Checklist (Module VII, Form C part 2)	Semi-Annual
Settlement Marker Survey	HWMU-2 Specific General Post-Closure Site Inspection Checklist (Module VII, Form C part 1)	Surveys once every six months for the first year after construction; And annually thereafter. When a settlement of 0.1 foot or less has been measured for two consecutive years, surveys shall be conducted once every five years.
Perimeter Fence, Gates, Locks & Signs	HWMU-2 Specific General Post-Closure Site Inspection Checklist (Module VII, Form C part 1)	Semi-Annual
Access Road	HWMU-2 Specific General Post-Closure Site Inspection Checklist (Module VII, Form C part 1)	Semi-Annual
Well monuments (damage, oxidation)	HWMU-2 Specific General Post-Closure Site Inspection Checklist (Module VII, Form C part 1)	Semi-Annual
Exposed well casing (structural integrity, cracks,	General Site Inspection HWMU-2 Specific General	Semi-Annual

& corrosion) and well caps. Well id markers, surface pads, and dedicated wells.	Post-Closure Site Inspection Checklist (Module VII, Form C part 1)Checklist (Form C part 1)	
Emergency Response (earthquake, storms, fire)	HWMU-2 Specific Emergency Response Post-Closure Site Inspection Checklist (Module VII, Form C part 3)	As soon as possible after an earthquake or heavy storm

6.1.5. Inspection Follow-Up

All copies of completed site inspection checklists (Form C, parts 1-3, Module VII) will be forwarded to the Dugway Environmental Office. If significant damage or erosion is observed, the Dugway Environmental Office will be contacted immediately by telephone. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Environmental Program Office
Dugway Proving Ground, UT 84022
(435) 831-3560

The Dugway Environmental Office will notify the appropriate personnel to implement corrective action as needed.

6.2. Reporting

This section summarizes the reporting requirements for HWMU 2 during the post-closure period (Table 6-3).

6.2.1. Non-Compliance

In the event a non-compliant issue is observed at HWMU 2, which may endanger public water supplies, human health, or the environment, the Dugway Environmental Office shall be notified immediately. Dugway will notify the Executive Secretary orally within 24 hours. A written notification will be submitted to UDEQ-DSHW within five days after oral notification with a planned corrective action or within 15 days if the Executive Secretary waives the five-day notification. If the non-compliance does not affect human health or the environment, the written notification will be submitted at the time monitoring reports are submitted (UAC R315-3.1(l)(10)). At a minimum, the following information will be provided:

1. Name, address, and telephone number of the Permittee;
2. Name, address, and telephone number of individual making the report;
3. Date, time, and type of incident;
4. Description and quantity of materials involved;
5. The extent of injuries or damage (if any);

6. An assessment of actual or potential hazard to the environment and health outside the facility; and
7. Estimated quantity and disposition of recovered materials.

The remote site conditions at HWMU 2 are such that impacts to human health outside the site itself are very unlikely. HWMU 2 is located in a very remote part of a controlled federal facility. Hazardous materials are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance, the above requirements apply.

Table 6-3: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post Closure Reports shall be submitted to the DSHW no later than March 1st, of the following year, that the report is due. Reporting years are odd numbered years beginning with 2005, for the duration of the Post-Closure Monitoring Period.
Anticipated Non-Compliance (Module VII.C.5).	30 days advance notice of any change, which may result in non-compliance.
24-hour Notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (Module VII.C.5.).	Orally within 24 hours of discovery noncompliance.
Five-day written notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Executive Secretary may waive the 5-day notice, in favor of a 15-day notice (Module VII.C.5.).	Within 5 days of discovery
Written notification on information concerning the non-compliance, which does not endanger human health or the environment (Module VII.C.5.).	Submitted with the Biannual Post Closure Report are submitted.

6.3 Post-Closure Reporting

A Biennial Post-Closure Report is required during post-closure care. The Biennial Report shall be submitted to DSHW no later then March 1st, of the following year, that the report is due. The first Post-Closure reporting year is 2005 for HWMU 2. The report shall be submitted no later than March 1st of 2006. The following sections describe the

6.3.1. Biennial Post-Closure Report

In accordance with R315-3-3.1(l)((9), a Biennial Post-Closure Report will be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care. Specifically for HWMU 2, the Biennial Post-Closure Report will include the following:

1. General site description and conditions;
2. Inspection records (Form C Module VII);
3. Settlement marker readings;
4. Notification procedures; and
5. Maintenance/Repairs performed.

7.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Executive Secretary, Dugway will submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

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DUGWAY PERMIT

MODULE VII

ATTACHMENT 3

APPENDIX A

HWMU 2

CERTIFICATION OF CLOSURE

DUGWAY PERMIT

MODULE VII

ATTACHMENT 3

HWMU 2

FIGURES